



Agra Smart City Limited, Agra

REQUEST FOR PROPOSAL

Ref. No.

Request for Proposal Document for Selection of Design Built Contractor:

For Design, Engineering and Construction for Redevelopment of under pass Bridge (Mughal Puliya), near Gobar Chowki at Fatehabad Road, Agra (2nd Call)

**Agra Smart City Limited (ASCL), Office of Nagar Nigam,
Agra, UP-282001**

Issued on: March 2022

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Tender Details:

Name of Work	RFP for Design, Engineering and Construction for Redevelopment of under pass Bridge (Mughal Puliya), near Gobarr Chowki at Fatehabad Road, Agra (2 nd Call)
Name of Client	Agra Smart City Ltd.
Date of Issue/ Publication	11 th March 2022
Pre-Bid meeting	22 nd March 2022
Bid Document Cost	Rs. 5,000/- (Rupees Five Thousand only) + 18% GST
Bid Security (Earnest Money)	Rs. 10, 00,000/- (Rupees Ten Lacs only) to be submitted along with the RFP.
Due Date of Bid Submission	25 th March 2022 15:00 Hrs.
Time and Date of Bid Opening	26 th March 2022 after 15:00 Hrs.
Validity of the Bid	90 days from the date of receipt of the Tender.
Undertaking the work	Within 15 days from the date of signing of agreement

DISCLAIMER

The information contained in this Request for Proposal document ("RFP document) or subsequently provided to Applicant(s), whether verbally or in documentary or in any other form, by or on behalf of Agra Smart City Ltd. or any of its employees or advisors, is provided to the Applicant(s) on the terms and conditions set out in this RFP document and all other terms and conditions subject to which such information is provided in writing.

This RFP document is intended to be and is hereby issued only to the prospective Applicants. The purpose of this RFP document is to provide the Applicant(s) with information for Design, Engineering and Construction for Redevelopment of under pass Bridge (Mughal Puliya), near Gobar Choki at Fatehabad Road, Agra. This RFP document does not purport to contain all the information that each Applicant may require. This RFP document may not be appropriate for all persons, and it is not possible for the Agra Smart City Ltd., its employees or advisors to consider the investment objectives, financial situation and particular needs of each Applicant who reads or uses this RFP document. The assumptions, assessments, statements and information contained in the RFP document may not be complete, accurate, adequate or correct. Each Applicant should, therefore, conduct its own investigations and analysis and should check the accuracy, adequacy, correctness, reliability and completeness of the assumptions, assessments, statements and information contained in this RFP document and where necessary obtain independent advice from appropriate sources. The Agra Smart City Ltd., its employees and advisors make no representation or warranty and shall incur no liability under any law, statute, rules or regulations as to the accuracy, adequacy, correctness, reliability or completeness of the RFP document.

Information provided in this RFP document to the Applicant(s) is on a wide range of matters, some of which may depend upon interpretation of law. The information given is not intended to be an exhaustive account of statutory requirements and should not be regarded as a complete or authoritative statement of law. The Agra Smart City Ltd. accepts no responsibility for the accuracy or otherwise for any interpretation or opinion on law expressed herein.

The Agra Smart City Ltd., its employees and advisors make no representation or warranty and shall have no liability to any person, including any Applicant under any law, statute, rules or regulations or tort, principles of restitution or unjust enrichment or otherwise for any loss, damages, cost or expense which may arise from or be incurred or suffered on account of anything contained in this RFP document or otherwise, including the accuracy, adequacy, correctness, completeness or reliability of the RFP document and any assessment, assumption, statement or information contained therein or deemed to form part of this RFP document or arising in any way for participation.

The Agra Smart City Ltd. also accepts no liability of any nature whether resulting from negligence or otherwise howsoever caused arising from reliance of any Applicant upon the statements contained in this RFP document.

The Agra Smart City Ltd. may in its absolute discretion, but without being under any obligation to do so, update, amend or supplement the information, assessment or assumptions contained in this RFP document before the last date of bid submission.

The issue of this RFP document does not imply that the Agra Smart City Ltd. is bound to select an Applicant or to appoint the selected Applicant or Concessionaire, as the case may be, for the Project

and the Agra Smart City Ltd. reserves the right to reject all or any of the Applicants or Bids without assigning any reason whatsoever.

The Applicant shall bear all its costs associated with or relating to the preparation and submission of its Bid including but not limited to preparation, copying, postage, delivery fees, expenses associated with any demonstrations or presentations which may be required by the Agra Smart City Ltd. or any other costs incurred in connection with or relating to its Bid. All such costs and expenses will remain with the Applicant and the Agra Smart City Ltd. shall not be liable in any manner whatsoever for the same or for any other costs or other expenses incurred by an Applicant in preparation or submission of the Bid, regardless of the conduct or outcome of the Bidding Process.

For more details contact Chief Executive Officer, ASCL address- CEO, ASCL Nagar Nigam, Agra, contact no. 0562-2520615 and through mail at agrasmartcitylimited@gmail.com

Also, the tender document can be downloaded from the following portals:

<http://etender.up.nic.in>, www.smartnet.niua.org

Section 1: Letter of Invitation

1. The Agra Smart City Ltd. (hereinafter called “Employer”) is inviting proposals for Request for Proposal Document for Selection of Design Built Contractor: For Design, Engineering and Construction for Redevelopment of under pass Bridge (Mughal Puliya), near Gobar Chowki at Fatehabad Road, Agra
2. More details on the services are provided in the Terms of Reference in this RFP document and qualification requirement is at Instructions to Bidders.
3. BIDDER will be selected under “Quality and Cost Based System (QCBS)” and procedures described in this RFP.
4. The RFP includes the following documents:
 - Section 1 - Letter of Invitation
 - Section 2 - Instructions to Bidders (Part 1)
 - Section 3 - Instructions to Bidders (Part 2)
 - Section 4 - Terms of Reference
 - Section 5 - Technical Proposal
 - Section 6 - Financial Proposal
 - Section 7 - Forms of Contract

Chief Executive Officer (CEO)

ASCL

Section 2: Instructions to Bidders - Part I

2.1. Definitions

- a) "Addendum" means the clarification issued against the bidder's query placed before the employer in writing before or during the pre-bid meeting. It may be release in form of addendum or corrigendum.
- b) "Employer" means the Agra Smart City Ltd. who have invited the bids for the services and/ or with which the selected Bidder signs the Contract for the Services and to which the selected bidder shall provide services as per the terms and conditions and TOR of the contract.
- c) "Bidder" means any entity or person or associations of person who have been requested to submit their proposals that may provide or provides the Services to the Employer under the Contract.
- d) "Contract" means the Contract signed by the Parties and all the attached documents listed in its Clause, that is the General Conditions (GC), the project Specific Conditions (SC), and the Appendices.
- e) "Project specific information" means such part of the Instructions to Bidders used to reflect specific project and assignment conditions.
- f) "Day" means calendar day.
- g) "Government" means the government of India /State/Local Government/Agra.
- h) "Instructions to Bidders" means the document which provides Bidders with all information needed to prepare their proposals.
- i) "LOI" means the Letter of Invitation being sent by the Employer to the bidders.
- j) "Personnel" means professionals and support staff provided by the Bidder or by any Sub-Bidder and assigned to perform the Services or any part thereof; "Foreign Personnel" means such professionals and support staff who at the time of being so provided had their domicile outside the Government's country; "Domestic Personnel" means such professionals and support staff who at the time of being so provided had their domicile in India.
- k) "Proposal" means the Technical Proposal and the Financial Proposal.
- l) "RFP" means the Request for Proposal prepared by the Employer for the selection of Bidders, based on the SRFP.
- m) "SRFP" means the Standard Request for Proposals, which must be used by the Employer as a guide for the preparation of the RFP.
- n) "Assignment / job" means the work to be performed by the Bidder pursuant to the Contract.
- o) "Sub-Bidder" means any person or entity with whom the Bidder subcontracts any part of the Assignment/ job.
- p) "Terms of Reference" (TOR) means the document included in the RFP as Section 5 which explains the objectives, scope of work, activities, tasks to be performed, respective responsibilities of the Employer and the Bidder, and expected results and deliverables of the Assignment/ job.

2.2. Introduction

- a) The Employer named in the Data Sheet will select Bidder (the Bidder) meeting basic eligibility criterion as mentioned in document and in accordance with the method of selection specified in the document.
- b) The name of the Assignment/ job has been mentioned in the Data Sheet. Detailed scope of the assignment/ job has been described in the document.
- c) The date, time and address for submission of the proposals has been given.
- d) The Bidders are invited to submit their Proposal, for Assignment/ job named. The Proposal will be the basis for contract negotiations and ultimately for a signed Contract with the selected Bidder.
- e) Bidders should familiarize themselves with Local conditions and take them into account in preparing their Proposals. To obtain first-hand information on the Assignment/job and Local conditions, Bidders are encouraged to submit the clarification online before or on the date of pre-bid meeting and are also advised to attend a pre-bid meeting. Attending the pre-proposal meeting is optional.
- f) The Employer will provide at no cost to the Bidders the inputs and facilities specified in the document, assist the bidders in obtaining licenses and permits needed to carry out the Assignment/ job, and make available relevant project data and reports.
- g) Bidders shall bear all costs associated with the preparation and submission of their proposals and contract negotiation. The Employer is not bound to accept any proposal, and reserves the right to annul the selection process at any time prior to Contract award, without thereby incurring any liability to the Bidders.

2.3. Eligibility of Association of bidders and sub-bidders

- a) Bidder shall not be permitted to form an association, joint-venture or consortium of bidders for this proposal. If the bidder has formed an association of bidders, such an association of bidder is liable to be rejected by the Employer.

2.4. Clarification and Amendment of RFP Documents

- a) Bidders may request a clarification on any clause of the RFP documents till or on the date of pre- bid meeting. Any request for clarification must be sent by standard electronic means to the Employer's address indicated.
- b) At any time before the submission of Proposals, the Employer may amend the RFP by issuing an addendum by standard electronic means.

2.5. Conflict of Interest

- a) Employer requires that Bidders provide professional, objective, and impartial advice and at all times hold the Employer's interests paramount, strictly avoid conflicts with other Assignment/ jobs or their own corporate interests and act without any consideration for future work.
- b) Without limitation on the generality of the foregoing, Bidders, and any of their affiliates, shall be considered to have a conflict of interest and shall not be recruited, under any of the circumstances set forth below:

- **Conflicting activities:** (i) Bidder that has been engaged by the Employer to provide goods, works or Assignment/ job other than Assignment/ job for a project, and any of its affiliates, shall be disqualified from providing Assignment/ job related to those goods, works or Assignment/ job. Conversely, Bidder hired to provide Assignment/ job for the preparation or implementation of a project, and any of its affiliates, shall be disqualified from subsequently providing goods or works or Assignment/ job other than Assignment/ job resulting from or directly related to the BIDDER's Assignment/ job for such preparation or implementation. For the purpose of this paragraph, Assignment/ job other than consulting Assignment/ job are defined as those leading to a measurable physical output, for example surveys, exploratory drilling, aerial photography, and satellite imagery.
 - **Conflicting Assignment/ job;** (ii) A Bidder shall not be hired for any Assignment/ job that, by its nature, may be in conflict with another Assignment/ job of the Bidder to be executed for the same or for another Employer. For example, a Bidder assisting an Employer in the privatization of public assets shall not purchase, nor advise purchasers of, such assets. Similarly, a Bidder hired to prepare Terms of Reference for an Assignment/ job shall not be hired for the Assignment/ job in question.
 - **Conflicting relationships** (iii) A Bidder (including its Personnel) that has a business or family relationship with a member of the Employer's staff who is directly or indirectly involved in any part of (i) the preparation of the Terms of Reference of the Assignment/ job, (ii) the selection process for such Assignment/ job, or (iii) supervision of the Contract, may not be awarded a Contract, unless the conflict stemming from this relationship has been resolved in a manner acceptable to the Employer throughout the selection process and the execution of the Contract.
- c) Bidders have an obligation to disclose any situation of actual or potential conflict that impacts their capacity to serve the best interest of their Employer, or that may reasonably be perceived as having this effect. Any such disclosure shall be made as per the Standard forms of technical proposal provided herewith. If the bidder fails to disclose said situations and if the Employer comes to know about any such situation at any time, it may lead to the disqualification of the Bidder during bidding process or the termination of its Contract during execution of assignment.

2.6. Unfair Advantage

- a) If a Bidder could derive a competitive advantage from having provided consulting Assignment/job related to the Assignment/job in question and which is not defined as conflict of interest, the Employer shall make available together with this RFP all information that would in that respect give such Bidder any competitive advantage over competing Bidders.

2.7. Proposal

Bidders may only submit one proposal. If a Bidder submits or participates in more than one proposal, such proposals shall be disqualified.

2.8. Proposal Validity

90 days from the date of receipt of the Tender.

2.9. Preparation of Proposals

- a) The Proposal as well as all related correspondence exchanged by the Bidders and the Employer, shall be written in English language.
- b) In preparing their Proposal, Bidder is expected to examine in detail the documents comprising the RFP. Material deficiencies in providing the information requested may result in rejection of a Proposal.
- c) While preparing the Technical Proposal, Bidder must give particular attention to the following:
 - i. Depending on the nature of the Assignment/ job, Bidders are required to submit a Technical Proposal (TP) in forms provided in the RFP. Form Tech – I is a sample letter of technical proposal which is to be submitted along with the technical proposal.
 - ii. A brief description of the bidder's, organization will provide details of experience of assignments which are similar to the proposed assignment/ job as per the terms of reference. For each Assignment/ job, the outline should indicate the duration of the Assignment/ job, contract amount, and Bidder's involvement. Information should be provided only for those Assignment/ jobs for which the Bidder was legally contracted by the Employer as an Bidder. Bidders should be prepared to substantiate the claimed experience along with the proposal and must submit letter of award / copy of contract for all the assignments mentioned in the proposal.
 - iii. A description of the approach, methodology and work plan for performing the Assignment/ job covering the following subjects: technical approach and methodology, work plan, and organization schedule. Guidance on the content of this section of the Technical Proposals is provided. The work plan should be consistent with the Work Schedule which will show in the form of a bar chart the timing proposed for each activity.
- d) Financial Proposals: The Financial Proposal shall be prepared using the attached Standard Forms. It shall list all costs associated with the Assignment/ job. The financial proposal shall not include any conditions attached to it and any such conditional financial proposal shall be rejected summarily.

2.10. Taxes

- a) The Bidder shall fully familiarize themselves about the applicable taxes (such as: GST or income taxes, duties, fees, levies) on amounts payable by the Employer under the Contract. All such taxes must be included by the bidder in the financial proposal excluding GST.

2.11. Currency

- a) Bidders must express the price of their Assignment/ job in India Rupees.

2.12. Earnest Money Deposit (EMD) and Bid Processing Fees

All bids must be accompanied by a Bid Security (EMD) of Rs. 10,00,000/- (Rupees Ten Lacs only) in accordance with the provisions of this RFP in the form of FDR/TDR of scheduled Bank which shall be duly pledged in favor of “Chief Executive Officer, Agra Smart City Ltd” payable at Agra. The scanned copy of bid document fee (Tender Cost), Earnest Money, Power of attorney must be up loaded electronically along with all the bid documents.

2.13. Bid Processing Fees

All bidders are required to pay Rs.5,000/- (Rupees Five Thousand only) +18% GST in the form of Demand Draft scheduled Bank which shall be duly pledged in favor of “Chief Executive Officer, Agra Smart City Ltd. The Bid Processing Fee is Non-Refundable. Non-submission of Bid Processing fee along with the Technical Proposal will be treated as non-responsive bid.

2.14. Submission, Receipt and Opening of Proposal

- a) The original proposal, both technical and Financial Proposals shall contain no interlineations or overwriting, except as necessary to correct errors made by the Bidders themselves. The person who signed the proposal must initial such corrections. Submission letters for both Technical and Financial Proposals should respectively be in the format of TECH-1, and FIN- 1.
- b) An authorized representative of the Bidders shall initial all pages of the original Technical and Financial Proposals. The authorization shall be in the form of a written power of attorney accompany the Proposal or in any other form demonstrating that the representative has been dully authorized to sign.
- c) Applicant (authorized signatory) shall submit its offer for preliminary qualification, technical and financial proposal e-procurement system. However, Tender Document Fees, and Earnest Money Deposit (EMD) should be deposited as per details provided in the bid document. The bid document complete in all respect is to be submitted on or before the time of last date of submission of bid through e-procurement system. Agra Smart City Ltd. will not be responsible for delay in submission due to any reason.
- d) Bidders who wish to participate in this proposal will have to register on e- procurement system of UP Govt. to participate in online proposals, bidders will have to procure Digital Signature Certificate. Bidders who already have a Valid Digital Certificate need not procure a new digital certificate. Before electronic submission of proposal, it should be ensured that all the proposal papers including conditions of contract are read, understood by the Applicant. The uploaded document of the bid shall contain no alteration, or additions, unless notified. In case, the bidder makes addition and/or correction, the provision written in the original document, read with the addendum or corrigendum issued shall prevail. However, scanned copy or proposals technical eligibility document and financial eligibility documents and all original papers related to Bank Guarantee, Power Attorney etc. should be uploaded with the technical bid. The Applicant shall provide all the information sought under this RFP document. The Agra Smart City Ltd. will evaluate only those Bids that are received in the required formats and complete in all respects.

- e) The Bid shall be typed or written in indelible ink and signed by the authorized signatory of the Applicant who shall also initial each page, in blue ink. All the alterations, omissions, additions or any other amendments made to the Bid shall be initialed by the person(s) signing the Bid.
- f) Bidder shall submit their offer only in online electronic format both for technical and financial proposal and all documents should be digitally signed. However, scanned copy of Proposal fees, EMD and all original papers related to Bank guarantee, power of attorney etc. as mentioned in Table and should be uploaded along with the technical bid.

2.15. Proposal Evaluation

- a) From the time the Proposals are opened to the time the Contract is awarded, the Bidders should not contact the Employer on any matter related to its Technical and/or Financial Proposal. Any effort by Bidders to influence the Employer in the examination, evaluation, ranking of Proposals, and recommendation for award of Contract may result in the rejection of the Bidders' Proposal.
- b) The employer has constituted an Evaluation Committee which will carry out the entire evaluation process.
- c) **Evaluation of Technical Proposals:** The Evaluation Committee while evaluating the Technical Proposals shall have no access to the Financial Proposals until the technical evaluation is concluded and the competent authority accepts the recommendation.
- d) The Evaluation Committee shall evaluate the Technical Proposals on the basis of their responsiveness to the Terms of Reference and by applying the evaluation criteria, sub-criteria specified in the Data sheet. In the first stage of evaluation, a Proposal shall be rejected if it is found deficient as per the requirement indicated in the Data sheet for responsiveness of the proposal. Only responsive proposals shall be further taken up for evaluation. Evaluation of the technical proposal will start first and at this stage the financial bid (proposal) will remain unopened. The qualification of the bidder and the evaluation criteria for the technical proposal shall be as defined in the Data sheet.
- e) **Opening of the Financial Proposals:** Financial proposals of only those bidder that are technically qualified shall be opened.
- f) In case of discrepancy between a partial amount and the total amount, or between word and figures, the former will prevail. In addition to the above corrections the items described in the Technical Proposal but not priced, shall be assumed to be included in the prices of other activities or items.
- g) After opening of financial proposals, appropriate selection method shall be applied to determine the bidder who will be declared winner and be eligible for award of the contract. The methods of selections are described in the RFP document [The employer shall mention here which method out of all listed method shall be applied for selection of bidder for this assignment / job]. This selected bidder will then be invited for negotiations, if considered necessary.

2.16. Negotiation

- a) Negotiations will be held at the date, time and address intimated to the qualified and selected bidder. Representatives conducting negotiations on behalf of the Bidder must have written authority to negotiate and conclude a Contract.

- b) Conclusion of the negotiations: Negotiations will conclude with a review of the draft Contract. To complete negotiations the Employer and the Bidder will initial the agreed Contract. If negotiations fail, the employer will reject all the proposals received and invite fresh proposals.

2.17. Award of Contract

- a) After completing negotiations, the Employer shall issue a Letter of Intent to the selected Bidder and promptly notify all other Bidders who have submitted proposals about the decision taken.
- b) The bidders will sign the contract after fulfilling all the formalities/ pre-conditions including Performance Guarantee as mentioned in the standard form of contract within 10 days of issuance of the letter of intent.
- c) The Bidder is expected to commence the Assignment/ job on the date and at the location specified in the document.

2.18. Confidentiality

- a) Information relating to evaluation of Proposals and recommendations concerning awards shall not be disclosed to the Bidders who submitted the Proposals or to other persons not officially concerned with the process, until the publication of the award of Contract. The undue use by any Bidder of confidential information related to the process may result in the rejection of its Proposal and may be subject to the provisions of the Employer's antifraud and corruption policy.
- b) The employer reserves the right to verify all statements, information and documents submitted by the Applicant in response to the RFP. Any such verification or the lack of such verification by the Employer to undertake such verification shall not relieve the Applicant of its obligation or liabilities here under nor will it affect any rights of the Employer here under.
- c) The selection process shall be governed by and construed in accordance with the laws of India and Distt. Courts at Agra and High Court of judicature at Allahabad shall have exclusive jurisdiction and all disputes arising under pursuant to and/or in connection with the Selection Process.

2.19. Special Purpose Vehicle (SPV):

Agra Smart City Ltd (ASCL) is the special Purpose Vehicle constituted for implementing various smart city projects in Agra and comprehensively supervise the works and activities carried out by the Bidder(s) as Engineer's Representative under the respective contract(s) in a manner that would ensure:

- a. Total compliance of technical specifications and various other requirements contained in the respective contracts by the Bidder(s);
- b. High standards of quality assurance system in the Consultancy as well as the works and activities of the Bidder(s);
- c. Comprehensive and documented reporting to the ASCL of Consultant's own activities, progress of the Project(s) and compliances/ non-

- compliances by the Bidder(s);
- e.** Proper verification of measurements and bills submitted by the Bidder(s) so that payments made by the ASCL against these bills truly reflect the actual work done at site complying with the requirements of the respective contract(s);
 - f.** proper interface and coordination among the ASCL, Bidder(s), other Bidders/ Bidders and local bodies/ state government; and
 - g.** Full documentation of the completed works including applications for various approvals.

Section -3 Instructions to Bidders - Part II

DATA SHEET

1. Name of the Assignment	:	Selection of Design Built Contractor: For Design, Engineering and Construction for Redevelopment of under pass Bridge (Mughal Puliya), near Gobar Chowki at Fatehabad Road, Agra
2. Eligibility of Association of bidders and sub-bidders		<ol style="list-style-type: none"> 1. The Bidder may be Single Entity means a company registered under companies act 1956 or companies act 2013 & operating in India For last 3 years 2. The Entity shall have experience in the field of, Engineering Designing and Detailing, Procurement, Construction, Commissioning, Project Monitoring and all related fields required for successful completion of Project Objective 3. Bidder should not be black listed with any Govt./ semi-Govt./ Statutory bodies/ Organizations 4. The Bidder should have experience of successfully completing similar design built lump-sum turnkey works under Govt./Quasi govt./under taking or PSU(Completion letter from client needs to be provided along with project credential) etc. during last five years as follows: <ol style="list-style-type: none"> i. One Similar work shall mean construction of Subway or bridges or flyovers on highways or arterial roads or railway crossings or grade separators contract of value not less than Rs.2.0 Crore OR ii. Two Similar work(s) shall mean construction of Subway or bridges or flyovers on highways or arterial roads or railway crossings or grade separators contracts of value not less than Rs.1.5 Crore each OR iii. Three Similar work(s) shall mean construction of Subway or bridges or flyovers on highways or arterial roads or railway crossings or grade separators contract of value not less than Rs.1.0 Crore each 5. The Bidder should have average aggregate annual financial turnover of at least Rs.2.0 Crore. during the last 3 financial years ending 31st March 2021. The Bidder should also have profits after taxes for each of these last 3 financial years. 6. The Bidder should have under its direct payroll or MOU, Engineering Design Personnel, Architect, Civil Engineers, Design Engineers, Electrical Engineer, Environment Expert, etc. <ol style="list-style-type: none"> i. Authorized by the Local/ Statutory/Municipal/ State/ Central bodies for obtaining Statutory Approvals / NOC as required for execution of tender works, AND ii. Experienced in Design, Detailing and execution of similar works.
3. Evaluation Criteria: Criteria, sub- criteria, for evaluation of Technical Proposals have		Detailed evaluation as mentioned below this Table of Data Sheet

been prescribed		
4. Last date for Purchase of Tender	:	25 th March 2022 till 13:00 Hrs.
5. Last date of Pre bid quires through mail at agrasmartcitylimited@gmail.com	:	21 st March 2022 at 11:00 Hrs.
6. Pre-Bid Meeting	:	22 nd March 2022 at 15:00 Hrs.
7. Last date for submission of tender	:	25 th March 2022 till 15:00 Hrs.
8. Last date for Submission of Hard Copy of Technical Bid	:	25 th March 2022 till 17:00 Hrs.
9. Technical Bid Opening Date	:	26 th March 2022 till 15:00 Hrs.
Tender Document and other details shall be available on: http://etender.up.nic.in , www.smartnet.niua.org		
10. Address for Correspondence : Chief Executive Officer, Agra Smart city Limited, Agra Nagar Nigam Agra, (utter Pradesh)		
11. Amendment to NIT, if any would be published on website only.		

Procedure for Detailed evaluation of technical qualifications

The BIDDERS will be shortlisted against the pre-qualification criteria. Those who qualify/fulfill these criteria, shall be considered for technical evaluation.

Sr.	Particulars	Supporting Documents to be Submitted
1.	The applicant can be Single firm. The applicant should submit valid incorporation/registration certificate of the firm, PAN Card and GST registration certificate.	Attested Copy
2.	The Bidder must have experience of at least 5 years Bidder must be a Contractor having experience in similar Work. Similar work(s) shall mean construction of foot over bridge or bridges or flyovers on highways or arterial roads or railway crossings or grade separators	The work orders with the details of employer has to be submitted.
3.	The Bidder must have a valid GSTN certificate and EPF registration.	Copy of GSTN Certificate & EPF registration certificate
4.	The bidder should not be blacklisted/ debarred/ terminated of contract except by any Government/ Government Board/ Corporation Agency/ firm/ Statutory Board/ PSU agency/ BIDDER/ Non- Government/ Government of any sovereign countries/ Private agencies and Funding agencies in the last 05 years.	Self-Certification by the bidder
5.	The bidder should have an average minimum annual turnover of Indian	Copy of the audited profit and loss account along with audited

	Rs.2,00,00,000.0 (Two crores only) during the last three (3) financial years, i.e., 2018-19, 2019-20 & 2020-21.	balance sheet of the Bidder showing turnover of the Bidder for last three years
6.	The bidder must have on its payroll at least 10 technically qualified staff (on permanent payrolls as on date.	Certificate from bidder's statutory auditor/ agency/ firm secretary/ HR Head for number of technically qualified staff employed by them.

The detailed technical evaluation of Proposals satisfying minimum eligibility conditions as above shall be done. The Criteria, sub-criteria and point system for detailed evaluation shall be as follows:

S.No.	Evaluation parameter	Marks
1.	Financial turnover	10
	Rs. 2.0 crores and less then Rs. 5.0 crores	05
	Rs.5.0 and above	10
2.	Specific experience of the Bidder relevant to the assignment / job	45
	1) construction of Bridge 20 Marks 2) Shifting of utilities like water supply line or other lines more than 700 mm dia 15 Marks 3) work experience for metro , tunnel or sub way 10 Marks	
3.	Organization structure and set up	10
	Established above 5 years	05
	Established above 10 years	10
4.	Organization & staffing	10
	10 Nos technically qualified staff on permanent payroll	05
	20 Nos technically qualified staff on permanent payroll	10
5.	Proposed Strategy, methodology and work plan in response to the terms of reference. Presentation in front of evaluating committee.	25
	Proposed concept plan and design of bridge 20 %	
	Detailed construction methodology including demolition of existing bridge, method of construction traffic diversion plan, utility shifting , obtaining necessary permission 30 %	
	Detailed work plan and technical personal to be deployed 30 %	
	Innovativeness in construction 20 %	

1. Evaluation of Technical Proposal: Only those proposals which score a minimum of 60 marks out of 100 in the Technical Evaluation shall qualify for next stage of bidding process i.e. opening of Financial Bids. Technical score of other applicants will be calculated as Technical Score (St) = $100 \times S_m / S$ where S_m is the technical marks of proposal under consideration and S the technical marks of the applicant with highest technical marks. The weightage given to the technical score is 70%
2. Evaluation of Financial Bid: At the second stage, the financial evaluation will be carried out as per this clause. For financial evaluation, the financial quote indicated in the Financial bid shall be considered. Financial Score $S_f = 100 \times F_m / F$, in which S_f is the financial score, F_m is the lowest price and F the price of the proposal under consideration. The weightage given to the financial score is 30%
3. ASCL will determine whether the Financial Proposals are complete, unqualified and unconditional. The cost indicated in the Financial Proposal shall be deemed as final and reflecting the total cost of works. Omissions, if any, in costing any item shall not entitle the firm to be compensated and the liability to fulfill its obligations as per the TOR within the total quoted price shall be that of the Applicant.
4. Combined and Final evaluation: After determining the financial score, the shortlisted Applicant will be given total score which will be determined as under Total score = Technical Score (ST) *0.7 + Financial Score (SF) *0.3

Proposals of the post qualified Applicant during the process of evaluation of the technical bid will finally be ranked according to the total score. The selected Applicant shall be the first ranked Applicant (whose total score as calculated above is the highest). The second ranked Applicant shall be kept in reserve and may be invited for negotiations in case the first ranked Applicant withdraws, or fails to comply with the requirements specified hereinabove.

Section 4: Terms of Reference (TOR)

4.1 Background

Agra city is governed by Municipal Corporation which comes under Agra Metropolitan Region. The Agra city is located in Uttar Pradesh state of India. As per provisional reports of Census India, population of Agra in 2011 is 1,585,704; of which male and female are 845,902 and 739,802 respectively. Although Agra city has population of 1,585,704; its urban / metropolitan population is 1,760,285 of which 939,875 are males and 820,410 are females.

4.2 Project Brief

The existing underpass is located near Gabbar Choki at Fatehabad road, Agra. It is a very old underpass as it is evident from the construction material used. The condition of the underpass is very poor. The underpass is the brick masonry arch constructed with lime mortar. Presently the joints of the bricks are getting widened and the mortar is also falling. The quality of mortar indicates that the culvert might have been constructed before the commercial use of cement. Fatehabad road is one of the most important road and having heavy traffic flow. The clear span of arch culvert is 8.50 m. The width of the original underpass is about 14.00 m. The underneath is being used by the pedestrians, cycles, autos and 2 wheelers only connecting the habited areas on both sides of Fatehabad road.

2 nos. open drains had been constructed for the storm water in the underneath arch culvert. In addition, the hidden drains on either side of the culvert through pipes had also been constructed. These drains are having continuous flow of contaminated/sewer water which is not only badly smelling but also polluting the local environment by its fumes. Looking to the heavy traffic load on Fatehabad road the width of the culvert had been earlier extended by constructing the additional 600 mm thick RCC slab on either sides to provide additional carriageway. The condition of these slabs is also poor as reinforcement is exposed due to spalling of concrete. It is evident by the condition of slabs and other components that no maintenance has been done in past. In addition, two water mains of about 1.00 m diameter have been laid parallel to the culvert on both sides by the local body. On one side water main is resting on the steel truss and on other side on the RCC slab and beam arrangement. The protection of these water mains is very necessary to keep intact the local water supply. Therefore, all the necessary precautions have to be kept while constructing the new structure. Other utilities are not visible but before starting the work, the investigation of any other utilities is required and necessary action if necessary during the construction of bridge has to be taken. The brick masonry stair case is there on one side which may be reconstructed after the construction of new bridge.

4.3 Need of Project

- (a) The bricks of arch are slowly deteriorating and the gaps of the joints of the bricks are increasing which at some stage the bricks may start loosening and the arch may give way.
- (b) The pointing done by the lime mortar is coming out at many locations which indicate that the joints may fail in near future.
- (c) By appearance the brick masonry arch does not give a feeling of its strength and may become unserviceable in near future as the bricks are showing apparent damages.

- (d) The RCC slab which had been laid to increase the carriageway of main road is badly distressed as the concrete of the slab damaged, cover over the reinforcement has gone away and the concrete is spalling at no. of locations.
- (e) The reinforcement is totally exposed at no. of locations and rusting is clearly visible. The exposed reinforcement has been cut by the miscreants. The further rusting and the theft of reinforcement may lead to the failure of slab.
- (f) The open drains under the arch along with the under carriageway are in very bad condition. The possibility of seepage to the underground may damage the foundations of the masonry arch.

4.4 Scope of Work

Looking to the condition of the structures (masonry arch and RCC slabs) it is recommended that:

- 1) The site is in Taj Trapezium Zone. The bidder will be responsible to comply with relevant rules of Taj Trapezium Zone as well as follow all applicable pollution control rules and practices as laid down by concerned departments.
- 2) The stair case may be shifted and relocated at suitable place after the construction of bridge if required.
- 3) The water mains on both sides running parallel to the culvert should not be disturbed and due precautions have to be taken to avoid any likely damage to maintain the water supply before relocate.
- 4) The open drains under the arch along with the under carriageway to be reconstruct if required
- 5) All permissions related to construct, utility shifting and traffic diversion and all other clearance from various departments will be the sole responsibility of the selected bidder.

4.4.1 Design parameters

- Actual designing to be done by diverting the existing drain outside the box culvert or below the road level so that optimum utilization of space can be ensured
- Clear height of minimum 2.1 mtrs should be kept for safe passage of vehicles through under pass.
- In to In Width of underpass should be 11 mtrs including central wall
- Width of bridge should be kept at 27.3 mtrs.
- The drain should be designed in such a way that cross sectional area should match with existing drain and it could either be box drain or RCC hume pipe.
- The structure of box culvert to be designed as per IRC and other relevant standards.
- Approach road crust design should be GSB 175mm , WMM150 mm , WMM 75 mm , DBM 70 mm, BC 40 mm
- Contractor has to cater to all diversion of water flow during the drain construction and will be also responsible for diversion of traffic on top deck with appropriate barricading and marshals to control the traffic and parameters related to pollution control norms and safety also should be adhered to

Based on the above the bidder will have to prepare concept design and BOQ and submit to ASCL along with the bid documents and later on successful bidder will have to submit the detail designs and BOQ and get it vetted from reputed institutions and submit to ASCL and based on finalization of design and drawings commence the work.

4.5 Suggested Team Composition & Qualification Requirements

Project Manager having graduate in Civil Engineering having experience of 15 years and minimum 3 years similar experience .Supervisor having graduate in any discipline.

4.6 Time Schedule

The project duration is for 5 months from the date of contract. If the work is not completed within the stipulated period as per approved proposal, Agra Smart City Ltd. will not give any extra payment during the extended time period.

4.7 Payment Schedule

Payment will be made against achieving milestones of the project as stated in the contract as submitted by the invoice within 15 days after verification of the work.

4.8 Penalty clause

- a) In case of delay in delivery of material/execution, the ASCL may at his option, impose a penalty calculated at the rate of 0.1% per each day of the delayed goods/ balance work and up to a maximum deduction of 5% of the tender conditions of such portion only of the quantity as have not been delivered/executed on the specified date (five month from the date of agreement). Such reduction shall be in full satisfaction of the supplier's liability for the delay but shall not in any case exceed five per cent of the value. Once the maximum is reached the department may consider termination of contract.

Section 5: Technical Proposal

FORM TECH-1

LETTER OF PROPOSAL SUBMISSION

[Location, Date]

To,

The Chief Executive Officer,

Agra Smart City Ltd., Agra

Dear Sir,

We, the undersigned, offer to provide the Assignment/ job for **“Selection of Design Built Contractor: For Design, Engineering and Construction for Redevelopment of under pass Bridge (Mughal Puliya), near Gabbar Choki at Fatehabad Road, Agra”** in accordance with your Request for Proposal dated *[xx/xx/2021]* and our Proposal. We are hereby submitting our Proposal, which includes this Technical Proposal, and a Financial Proposal with requisite EMD and bid processing fees. We hereby declare that all the information and statements made in this Proposal are true and accept that any misinterpretation contained in it may lead to our disqualification.

If negotiations are held during the period of validity of the Proposal, we undertake to negotiate on the basis of the proposed staff. Our Proposal is binding upon us and subject to the modifications resulting from Contract negotiations.

We understand you are not bound to accept any Proposal you receive.

We remain,

Yours sincerely,

Authorized Signatory

[In full and initials]

Name and Title of Signatory:

Name of Organization:

Address:

FORM TECH-2

FORM 2 A: BIDDER'S ORGANIZATION AND EXPERIENCE

Details of Bidder

a.	Name of BIDDER with full address	
b.	Tel. No.	
c.	Fax No.	
d.	Email	
e.	Year & Date of Registration.	
f.	Name and address of the person holding the Power of Attorney.	
g.	Name of Bankers with full address.	
h.	GSTN Registration Number (copy).	
i.	Permanente Account Number (copy).	
j.	Are you presently debarred / Blacklisted by any Government Department /Public Sector Undertaking /Any Employer? (If Yes, please furnished details)	
k.	Name and details (Tel / Mobile / E mail) of contact persons	

FORM 2B: FORMAT FOR FINANCIAL CAPABILITY OF THE BIDDER

(Equivalent in Rs. crores)

Bidder	-----(<i>Name of Bidder</i>)				
FY	2018-19	2019-20	2020-21	Total	Average
Annual Turnover					

Certificate from the Statutory Auditor

This is to certify that..... (*Name of the Bidder*) has received the payments and annual turnover as shown above against the respective years.

Name of the audit firm:

Seal of the audit firm Date:

(*Signature, name and designation of the authorized signatory*)

FORM 2C: ENGAGEMENT EXPERIENCE

LIST PROJECTS IN THE LAST TEN YEARS WHICH ARE SIMILAR TO THAT IN THE RFP.

Assignment name:	Value of the contract (in current INR):
Country:	Duration of assignment (months):
Name of Employer:	Total No of staff-months of the assignment:
Address:	
Start date (month/year): Completion date (month/year):	
Narrative description of Project:	

(Along with the details the bidder is also required to submit the supportive documents/ Work undertaken for each of the projects)

FORM TECH-3

DESCRIPTION OF APPROACH, METHODOLOGY, AND WORK PLAN IN RESPONDING TO THE TERMS OF REFERENCE

A description of the approach, methodology and work plan for performing the assignment, including a detailed description of the proposed methodology and staffing for training.

1. Technical Approach and Methodology
 2. Work Plan
 3. Organization and Staffing
- a) **Technical Approach and Methodology.** Please explain your understanding of the objectives of the assignment as outlined in the Terms of Reference (TORs), the technical approach, and the methodology you would adopt for implementing the tasks to deliver the expected output(s), and the degree of detail of such output.
- b) **Work Plan.** Please outline the plan for the implementation of the main activities/tasks of the assignment, their content and duration, phasing and interrelations, milestones (including interim approvals by the Client), and tentative delivery dates of the reports. The proposed work plan should be consistent with the technical approach and methodology, showing your understanding of the TOR and ability to translate them into a feasible working plan. A list of the final documents (including reports) to be delivered as final output(s) should be included here. The work plan should be consistent with the Work Schedule Form.
- c) **Organization and Staffing.** Please describe the structure and composition of your team, including the list of the Key Experts, Non-Key Experts and relevant technical and administrative support staff.}

FORM TECH-4

CURRICULUM VITAE (CV) FOR PROPOSED PROFESSIONAL STAFF

1. Proposed Position:

[For each position of key professional separate form Tech-6 will be prepared]:

2. Name of Organization:

[Insert name of BIDDER proposing the staff]:

3. Name of Staff:

[Insert full name]:

4. Date of Birth:

5. Nationality:

6. Education:

[Indicate college/university and other specialized education of staff member, giving names of institutions, degrees obtained, and dates of obtainment]:

7. Membership of Professional Associations:

8. Other Training:

9. Countries of Work Experience:

[List countries where staff has worked in the last ten years]:

10. Languages [For each language indicate proficiency: good, fair, or poor in speaking, reading, and writing]:

11. Employment Record:

[Starting with present position, list in reverse order every employment held by staff member since graduation, giving for each employment (see format here below): dates of employment, name of employing organization, positions held.]:

From [Year]:

To Year]:

Employer:

Positions held:

12. Detailed Tasks Assigned

[List all tasks to be performed under this Assignment/job]

13. Work Undertaken that Best Illustrates Capability to Handle the Tasks Assigned

[Among the Assignment/jobs in which the staff has been involved, indicate the information for those Assignment/jobs that best illustrate staff capability to handle the tasks.]

Name of Assignment/job or project:

Year:

Location:

Employer:

Main project features:

Positions held:

Activities performed:

14. Certification:

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself, my qualifications, and my experience. I understand that any willful misstatement described herein may lead to my disqualification or dismissal, if engaged.

Date:

[Signature of staff member or authorized representative of the staff]

Place:

[Full name of authorized representative]

FORM TECH-5

STAFFING SCHEDULE

Sr.	Name of Staff	Staff input (in the form of bar chart)							Total Months
		1	2	3	4	N	
1									
2									
3									
4									

FORM TECH-6

LETTER OF DECLARATION FOR NOT HAVE BEEN BLACK LISTED

[Location, Date]

To,
The Chief Executive Officer,
Agra Smart City Ltd.
Agra Municipal Corporation, Agra

Subject: Letter of Declaration for not have been Blacklisted

We, *[Name of BIDDER]* have not been black listed/ debarred/ termination of contract except for reasons of convenience of Employer by any Government/ Government board/ Corporation/ Agency/ firm/ Statutory Body/ PSU Agency/ firm/ Non-Government/ Government of any sovereign countries/ Private Agencies and Funding Agencies in the last 15 years.

For *[Name of BIDDER]*,

Authorized Signatory [In full and initials]

Name and Title of Signatory:

Name of BIDDER:

Address

FORM TECH-7

POWER OF ATTORNEY

(To be on non-judicial stamp paper of appropriate value as per Stamp Act relevant to place of execution.)

Power of Attorney to be provided by the BIDDER in favor of its representative as evidence of authorized signatory's authority.

Know all men by these presents, We.....(name and address of the registered office of the BIDDER, as applicable) do hereby constitute, appoint and authorize Mr./ Ms.....(name and residential address) who is presently employed with us and holding the position of, as our Attorney to do in our name and our behalf all or any of the acts, deeds or things necessary or incidental to submission of our "....." in response to the TOR Document dated.....issued by Agra Smart City Ltd.), (the BIDDER) including signing and submission of the Bid and all other documents related to the Bid, including but not limited to undertakings, letters, certificates, acceptances, clarifications, guarantees or any other document which the BIDDER may require us to submit. The aforesaid Attorney is further authorized for making representations to the BIDDER or any other authority, and providing information/responses to the BIDDER, representing us in all matters before the BIDDER, and generally dealing with the BIDDER in all matters in connection with our Bid till the completion of the bidding process as per the terms of the TOR Document and further till the Contract is entered into with the BIDDER and thereafter till the expiry of the Contract.

We hereby agree to ratify all acts, deeds and things done by our said attorney pursuant to this Power of Attorney and that all acts, deeds and things done by our aforesaid attorney shall be binding on us and shall always be deemed to have been done by us.

All the terms used herein but not defined shall have the meaning ascribed to such terms under the TOR Document.

Signed by the within named ----- [Insert the name of the executant BIDDER] Through the hand of Mr..... Duly authorized by the Board to issue such Power of Attorney

Date this.....day of..... Accepted..... Signature of Attorney

(Name, designation and address of the Attorney)

Attested

.....

(Signature of the executant)

(Name, designation and address of the executant)

.....

Signature and tamp of Notary of the place of

execution

Section 6: Financial Proposal

FORM FIN-1

FORMAT FOR SUBMISSION OF FINANCIAL QUOTE

To be submit financial bid in e-Tender mode only

6.1 Terms of Payment of Contract Price

a) **ACTIVITY SCHEDULING:**

D = Date of issue of work order

Activity	Duration (in days)
Survey and Investigation	D+15
Preparation of detailed design drawings	D+30
Submission and Approval	D+60
Excavation & Construction of sub structure	D+90
Construction of super structure	D+150

	PAYMENT DURING DETAIL DESIGN & DRAWINGS	5% of the project cost
1	On submission of Design and Drawings	0%
2	On approval of Design, drawings	20%
3	optening all necessary clearances and permissions	50%
4	Proportionate to the agreed milestone-based Payment for construction	30%
C.	PAYMENT DURING CONSTRUCTION STAGE	95% of the project cost
1	On Completion of foundation works	20%
2	On Completion of super structure upto Roof Level	15%
3	On shifting and reinstallation of 1000 mm Diameter water supply pipe line and other utilities	20%
4	On Completion of Roof structure & Façade works	20%
5	On completion of approach roads	10%
6	On final testing , commissioning of all utilities	5 %
7	Submission of As built drawing, proving training, manual & obtaing all statutory clearances	5 %
8	After completion of Defect Liability period of 2 years	Balance Payment
	Note: Pro-rata payment options will be considered for the respective milestones if there is any change of scope.	

Section 7: TECHNICAL SPECIFICATIONS

Design approach and methodology:

As understand the underpass is located in the crowded area and heavy traffic is regularly plying on the road. Based on the site conditions and limitations feasible proposal shall be prepared. As we understand that the structure appears to be very old and therefore requires the special attention to finalize the specific methodology design. In addition, the traffic moving on the underpass road as well as on the main road over the underpass can also not be stopped for longer duration. In all it appears the complicated problem to be attended.

From the plan and our old experience of site visit it appears that a water supply line is also running parallel to the main road and very close to the underpass on both sides of the bridge. The water supply line is resting on the steel truss and girder arrangement. There are two drains having local domestic affluent (sewage) also running on edges of the underpass road. Therefore, considering all the aspects, the suitable proposal shall be prepared and finalized. The following IRC codes or relevant IS codes along with sound engineering practices shall be adopted for the design:

Sl. No.	IRC codes	Component
1	IRC:5	General features
2	IRC:6	Live loads on carriageway
3	IRC: 21	RCC components
4	IRC:78 & IS 2911	Foundations and substructure

In addition to above the relevant IS codes wherever required or the sound Engineering practices shall be adopted to get the safe and economical designs. The efforts shall be made for the construction friendly design so that the construction could be easier and fast. The designs shall be construction friendly so that the construction is easier.

1.1 The Contractor for this work shall be required to work in co-operation and co-ordination with other agencies on site and give them all reasonable assistance and help for the execution of the work in an efficient manner all as directed. The words "approved" or "as directed" shall be deemed to convey approval or the discretions of ENGINEER

1.2 Indian Standard Specifications

The particular Specifications for the work is as detailed hereinafter. These specifications shall be read in conjunction with the relevant Indian Standard Specifications, PWD specification (latest revision) and the obtainable local practice as detailed in various regional handbooks of practice and the work shall be executed accordingly. Where the specifications in any of the standards are at variance with the specifications detailed herein, the specifications herein shall govern.

In case of any ambiguity/contradiction among different specification, the decision of ENGINEER shall be final and binding on the Contractor.

1.3 Quality of materials & General Standards of work

The Contractor under this contract commits himself to use first class materials and assumes full responsibility for the quality of all material incorporated or brought for

incorporation in the work. The work shall be executed in accordance with best engineering practice and as per direction of Engineer /PMC. In all possible cases, sample approval shall be ensured by the Contractor from ENGINEER - IN – CHARGE before bringing in the materials in bulk at site and the approved sample shall be well preserved at site at the risk and cost of the Contractor as a ready reference. Over and above, the submission of test certificate by the manufacturer, ENGINEER - IN – CHARGE may instruct further sample testing from Government laboratories / testing houses at the risk and cost of the Contractor for submission of test reports to become eligible for payment for those particular items used at work.

In all possible cases, where the warranty of manufacturers are sought for by Engineer /PMC, the Contractor shall submit the cross warranty in the form as directed and in manner including workmanship etc. along with the manufacturer's warranty certificate. The relevant IS and PWD specification shall have to be complied for all possible cases. The relevant clauses of GCC shall also be applicable and should be read in conjunction with technical specification of this contract.

In case of any anomaly / contradiction, decision of ENGINEER shall be final and binding on Contractor.

No extra claim shall be admissible for sample testing, sample approval, testing of sample at site etc to the Contractor and shall be considered as deemed to have been included in the rates quoted by the Contractor.

All works shall be carried out strictly according to the drawings and instructions of ENGINEER/PMC. If, in the opinion of the Employer / Architects / Engineer – in – Charge, any portions of the work is found to be defective or unsound the same shall be pulled down and reconstructed at no extra cost to the employer. Defective materials shall not be brought to the work site by the contractor.

1.4 Acquaintance with Site Condition

The intending tenderer is deemed to have visited the work site and acquainted himself of the nature of the sub-soil to be executed. No claim or extra will be allowed as a result of any misunderstanding or incorrect assessment or misinformation or ignorance of the contractor on the prevailing site conditions or soil strata.

1.5 Scaffolding

All scaffolding and ladders required for the proper execution of the work shall be provided by the Contractor. The scaffolding should be stout and strong to prevent any collapse or displacement. Proper measure for safety of workmen working on scaffolding should be taken by the Contractor.

1.6 Measurements

The mode of measurements, wherever possible, is specifically mentioned in these documents, where it has not been mentioned, it shall be as per provision of the relevant Indian Standards IS 1200 or PWD Specification or Standard Practice as applicable. All the measuring equipments, labour, manpower and other accessories necessary, shall be provided by the Contractor at his own risk and cost.

1.7 Tools and plant

The tenderer along with his tender shall furnish a list of tools, plant and machinery which he Intends to use for the works. The list should indicate the exact type of machine, its capacity and year of manufacture, kind and capacity of propelling force, and all other pertinent information. The Contractor is obliged to use all the machinery mentioned in his list mentioned or others as required and instructed if ENGINEER considers it necessary.

1.8 Setting out

The Contractor shall set out the building or other involved works after clearing the site and get the same approved by the Engineer /PMC. It shall be the responsibility of the

Contractor to install substantial reference marks, bench marks, etc. and maintain them as long as required by the Engineer - in - Charge. The Contractor shall assume the full responsibility for proper setting out, alignment, elevation and dimension of each and all parts of the work.

1.9 Surveying

It is the express responsibility of the Contractor to bring to site all surveying instruments necessary for the marking out, fixation of levels, etc. and conduct these survey operations himself with utmost accuracy. The Contractor shall put-up stable bench marks etc. as necessary for the work. Representative (s) of ENGINEER - IN - CHARGE may be present when this work is being carried out and will inspect all these operations with the Contractor's assistance. The Contractor shall be entirely responsible for accurate setting out of the work and he shall at his own expense make good any defects arising from errors in line and levels.

Before commencement of excavation, spot levels on an approved grid covering the entire plot shall be taken by the Contractor in consultation with the Engineer - in - Charge and a proper record of these levels shall be kept jointly signed by the Contractor and the Engineer - in - Charge.

1.10 Dewatering

Dewatering of accumulated water in all locations on jobsite from whatever source or cause until the virtual completion of the entire work shall be done by the Contractor at his own expense and shall not be separately paid for. The rates quoted by the Contractor shall be deemed to be inclusive of this.

1.11 Access to site, approach roads and roads within the premises

The Contractor shall at his own cost provide all approach roads required for the purpose of carrying out the work in the most expeditious and efficient manner and shall remove the temporary roads on completion. He shall acquaint himself thoroughly regarding condition and suitability of public roads leading upto the limits of the premises and will provide vehicles for transportation of materials which meet the requirements of these road conditions. It shall also be responsibility of the Contractor to maintain at his own cost these roads till the construction is completed. The tenderer shall also acquaint himself with local laws and By laws and complying with all police and traffic requirements.

2 Earthwork

2.1 Excavation

Excavation for trenches over areas and for pits, etc. shall be done to widths, lines and levels as shown in drawings or to such lesser or greater widths lines and levels as directed. The bottom and side of excavation shall be trimmed to required levels, profile, etc. watered and thoroughly rammed. Where the Contractor excavated below required level in good ground inadvertently or carelessly they shall make up the void in concrete (1:5:10) at his own expense. During excavation the Contractor shall take necessary precaution to retain earth (viz sal ballah piling, shoring etc) so that the earth will not slide or fall down to avoid any accident and hamper the progress of work at his own risk , responsibilities and cost . They will take necessary step to prevent the damage the adjacent structure or existing services. They shall repair and make good any such damage at their own expense to the satisfaction of the Engineer - in - Charge. A suitable path for men and materials around the excavated pit should be maintained throughout the work.

2.2 Shoring

The sides of excavation should be supported in such a way as is necessary to secure these from falling in and the shoring shall be maintained in position as long as

necessary. The Contractor shall be responsible for the proper design of the shoring to be approved by the Engineer - in - Charge to hold the sides of the excavation in position and ensure safety of persons and properties. The shoring shall be removed as directed after the items for which it is required are completed. Unless otherwise mentioned in the schedule of quantities, no extra payment will be made for shoring.

2.3 Dewatering

All water which may get accumulated in excavations during the progress of work from whatever cause or source, shall be bailed or pumped out as necessary. The rates for excavation shall be deemed to include for the same.

2.4 Sand filling

Filling sand may be silver sand having silt content less than 5% by weight and 300mm compacted thick layers will be spread, wetted & saturated to achieve the compaction . However for any special case, ENGINEER - IN – CHARGE may instruct filling by sand other than silver sand which the Contractor shall comply .The specification etc shall be guided by relevant IS code

2.5 Filling

Filling under floors or other places indicated shall be done by fine sand or silver sand brought from outside by the Contractor. The material should generally be good quality. Filling shall be done in layers not exceeding 15 cms. thick and each layer shall be fully inundated and consolidated properly by using 8 to 10 T Roller or otherwise. For filling under floors Consolidation shall be done by hand rollers and pneumatic / plate vibrator followed by hand rammer. The surface of the filling shall be finished true to lines and levels as required. The compaction shall be such that minimum compacted density obtained on testing is 95% of the maximum dry density. In general test shall be performed for every 1000 M2 of compacted area. The filling of final level after compaction and ready to take up soling work under the floor item, shall be checked by ENGINEER - IN - CHARGE.

2.6 Disposal of excavated materials

All materials excavated shall be removed from the site of excavation and disposed off during excavation with prior written permission of ENGINEER - IN – CHARGE from the site in an approved manner with the approval of local authority. No extra claim on any account will be entertained. The Contractor must also secure the approval of the Engineer - in - Charge regarding the quantity of surplus materials to be removed prior to commencement of this item of work.

2.7 Back filling

All shoring and form work shall be removed after their necessity ceases and trash of any sorts shall be cleaned out from the excavation. All space between foundation masonry or concrete and sides of excavation shall be refilled to the original surface with approved excavated materials in layers of 15 cm in thickness, watered and rammed. The filling shall be done after concrete or masonry is fully set and done in such a way as not to cause undue thrust on any part of the structure. Where suitable excavated materials is to be used for refilling, it shall be brought from the place where it is temporarily stacked and used in refilling. No excavation of foundation shall be filled up or covered until all measurements of excavation, masonry, concrete and other works below ground level has been jointly recorded . Black cotton soil shall not be used for back filling or in plinth filling under any circumstances.

3 Controlled Cement Concrete – Plain & Reinforced

3.1 General

Concrete and reinforced concrete work shall be carried out generally in conformity with the latest Indian Standards IS : 456 except for provisions indicated herein below. All

work is to be carried out with utmost precision and upto date scientific know-how and the Contractor shall employ thoroughly competent staff to achieve the highest standards.

3.2 Cement

Cement for the work shall be either of ordinary Portland Cement conforming to the latest Indian Standards IS:8112 – 1989 for 43 grade and IS 12269 -- 1987 for 53 grade or Portland Pozzolana Cement conforming to IS 1489 (Part 1) 1991- specification (fly ash based) IS 1489 (Part 2) 1991, - specification (Calcined clay based) and of the best normal setting quality unless a quick setting quality is expressly instructed in the specifications or otherwise during the course of the work by ENGINEER - IN - CHARGE. If directed the Contractor shall purchase Portland cement as fresh as possible after manufacture and where there is reason to believe the cement has been long stored, ENGINEER - IN - CHARGE may demand a Laboratory Test Certificate regarding the character of cement and the Contractor shall furnish the same at no extra cost. ENGINEER - IN – CHARGE shall reject any cement which in its opinion does not meet the required standards.

The list of manufactures for cement as per the list of BOQ or as instructed in writing by ENGINEER - IN - CHARGE.

Any field or laboratory test for cement, if asked for by ENGINEER - IN – CHARGE shall be carried out at the risk and cost of the Contractor as per provision of relevant IS codes.

All bags and containers in which cement is packed shall be stored in a dry, weather-tight, properly ventilated structure with adequate provision against prevention and absorption of moisture. The Contractor shall at all times maintain for the inspection of ENGINEER - IN - CHARGE, a log book indicating the receipt of cement ,brand and agent from whom obtained and the age of cement. Cement which has caked or perished by being wet or otherwise, shall on no account be used on the work. Cement shall be consumed on the works in the same sequence as that of their receipt at site. Cement reclaimed from cleaning of bags or from spillage from containers or otherwise shall on no account be used. The cement is to be stacked in an orderly and accessible way to permit ENGINEER - IN – CHARGE physical verification of existing stock at all points of time. The Contractor has to ensure furnishing a copy of manufacturer batch test certificate along with every lot of supply .

If so felt , ENGINEER - IN – CHARGE may instruct the Contractor for further testing of cement in Govt. laboratories/testing houses has been detailed in the relevant clause of GCC,. over and above the / as submission of test certificates at the risk and cost of the Contractor .

3.3 Fine Aggregate

Fine aggregate shall generally conform to latest Indian Standards (IS:383). Sand shall be natural sand, crushed gravel sand or crushed stone sand at the discretion of ENGINEER - IN - CHARGE. Use of sea sand is prohibited. It shall be composed of hard siliceous material and shall be clean and of sharp angular grit type. Sand shall be properly graded minimising all voids.

Its grading shall fall within the limit of grading zone I , II for non-plastering work and Zone III for plastering work, of Table 1 (Ref clause no 3.1.4.3 of PWD specifications 1996 , revised to 2000 vide page no 33).

Allowance for bulking of sand shall be made. Silt content shall not be more than 5%. Laboratory equipment such as measuring jars etc. are to be kept at site for time to time checking of bulkage and silt content.

For sand testing periodicity may be given at the rate of every 150 cum of concrete work of all kinds (apart from RMC) and part thereof. For plastering work however, a separate periodicity of testing in term of every 500 SQM of plastering of any thickness

irrespective of number of coats and part thereof is to be adopted. For brick masonry one test for 100 cum or part thereof for masonry may be adopted. The tests so mentioned shall have to be carried out through reputed Central/State Government registered testing house/ laboratory and not from site testing facilities.

All tests, to carry out field as well as laboratory tests shall be borne by the Contractor

3.3.1 Coarse Aggregate

Coarse aggregate shall be approved hard aggregate generally conforming to latest Indian Standards : IS - 383. The following tests should be carried out for every new lot of supply :-

- Crushing value
- Impact value
- Sieve analysis
- Deleterious material
- Flakiness index

For every 150 CUM of concrete work of all kinds (apart from RMC) and part thereof one test shall be carried out.

All costs to carry out field as well as laboratory tests shall be borne by the Contractor .

3.4 Water

Water conforming to IS 456 - 2000 for all concrete work shall be clean, free from deleterious matter such as oils, acids, alkalies, sugar and vegetable matter. Every attempt shall be made to use water which is fit for drinking purposes. Water storages facilities provided by the Contractor shall be maintained properly to preclude contamination of water by any of the harmful substances. ENGINEER - IN – CHARGE may instruct the Contractor to carry out test of water sample as per provision of relevant IS code in Govt. laboratories and the Contractor shall comply the same at his risk and cost. The quantity of water to be added to concrete for mixing shall be such as to afford workability consistent with strength. Water/cement ratio shall be recorded in every batch of concrete. Arrangement for slump cone test shall be kept at site to arrive workability whenever ENGINEER - IN – CHARGE wants to check at site. The periodicity of testing may be conducted as once in every batch of concrete and part thereof.

3.5 Types of concrete, strengths etc.

The strength requirement of both controlled and ordinary concrete where ordinary Portland cement or Portland blast furnace slag cement is used shall be conforming to IS: 456.

Where ordinary Portland cement or Portland blast furnace slag cement is used, the compressive strength requirements for various grades shall be as given in Table II. It shall be the contractor's responsibility to obtain specified strength for the various grades of concrete.. Where rapid hardening Portland cement is used, 28 days compressive strength requirement specified in Table II shall be met at 7 days.

Strength requirements of concrete specified in volumetric proportions like 1:2:4 etc. will be corresponding to the following grades of concrete.

Concrete Mix	Corresponding Grade of Concrete
1: 2:4	M-15
1: 1.5 : 3	M-20
1: 1:2	M-25

MINIMUM CEMENT CONTENT SPECIFIED FOR DIFFERENT GRADES OF CONCRETE

Maximum free water Cement ratio	Grade of Concrete	Minimum Cement content (Kg/Cum)

0.55	M-20	300
0.50	M-25	300
0.45	M-30	320
0.45	M-35	340
0.40	M-40	360

STRENGTH REQUIREMENTS OF CONCRETE

Comprehensive strength of 15 cm x 15 cm cubes at 7 days and 28 days curing, (works test only) conducted in accordance with IS:516-1959 with all value in kg/sq.cm

Grade	Preliminary Test (7 Days) (Minimum)	Mark Test (28 Days) (Minimum)
M-10		
M-20	100	150
M-25	135	200
M-30	170	250
M-35	200	300
M-40	270	400

In case, the test results obtained from testing of sample cubes fail to attain specified strength of concrete, it will be considered as a result of negligence on the part of the contractor and in such cases the acceptance of work shall be in following manner.

REDUCTION IN STRENGTH	PART RATE TO BE PAID
Upto 5%	6/7 th of contract rate
5% to 10%	5/7 th of contract rate
Above 10%	To be rejected

Sufficient number of cube mould should be kept ready at site.

The type of concrete for any particular situation or work shall be as per instructions given to the Contractor by ENGINEER - IN - CHARGE notwithstanding anything contained in the foregoing clauses.

3.6 Tests for determination of strength of Reinforced concrete

As will be apparent from the Bill of Quantities, the strength of concrete specified is the criterion and the Contractor shall make every effort to obtain the specified strengths by good quality control. In case of concrete which does not obtain the specified strength at 28 days, such work shall be demolished and reconstructed to obtain the requisite strengths all as directed by ENGINEER - IN - CHARGE. To determine whether concrete in any particular part of the work is of the requisite strength or not, test cubes (works test cubes) shall be made from samples collected from the concrete being poured for the particular part and determined as per acceptance criteria detailed hereinafter. The salient features for the collection of samples is as indicated below :

The size of cubes to be prepared and tested shall be 15 x 15 x 15 cm.

All costs for sampling and field as well as laboratory testing shall be borne by the Contractor.

3.6.1 Number of tests

The number of cube tests in a work shall be entirely at the discretion and as directed by the Controlling Officer of the work. Cubes shall generally be collected for various structural members and also for works at various levels. It shall also be collected whenever the usual quality for a particular strength is in suspect. The number of cubes may at most be twelve or even more as instructed by ENGINEER - IN – CHARGE and as per provisions of relevant IS code on any given day in a particular work. However, in case other important casting works are running in parallel with a major concreting work, additional cubes in the range of six or twelve shall be taken for each of them as well.

3.6.2 Preparation and Testing of Cubes

Casting of cubes, preparation of moulds for the same, processing and curing the cubes and pressure testing the same shall be as per detailed instructions which will be issued to the Contractor from ENGINEER - IN – CHARGE from time to time or as per relevant Indian Standard as amended upto date as directed. All costs to be borne by the Contractor .

3.6.3 Equipment modules, testing etc.

It is the entire responsibility of the Contractor to prepare and get the cubes tested and provide for all material, labour, modules, equipment, facility and charges for sampling , testing etc. The Contractor's rate for concrete work shall be deemed to include for these and no extra whatsoever is admissible on this account.

3.6.4 Criteria for acceptance of work

The test and acceptance criteria shall comply to relevant IS codes including IS :456 Part or element of concrete work shall be deemed to be acceptable, provided the three cubes tested for 28 days strength conform to the following:

Average of the three cubes strengths shall not be less than the specified strength.

No individual cube strength shall be less than 90% of the specified strength.

If any individual cube strength exhibits more than 133% of the specified strength, such cube shall be classified as freak and criteria above, shall be applied for the remaining two cubes only and the acceptability determined. Reference is drawn to Clause 2.3.5 in this connection incases of failure.

3.6.5 Quantum of cubes and testing

The decision of ENGINEER - IN - CHARGE in this regard shall be final and binding.

Cube testing shall be done at site regularly and at least 20% of this testing shall be carried out in the reputed laboratory.

Testing machine with valid calibration certificate to be kept at site for crushing of cubes. The testing shall be duly witnessed and approved by ENGINEER - IN - CHARGE.

All costs to carry out tests at field as well laboratory shall be borne by the Contractor.

3.7 Batch Mixed Concrete

Concrete shall always be mixed in a mechanical mixer unless specially approved by Engineer. Hoppers for weighing cement, mineral admixtures, aggregates and water and chemical admixture (if measured by mass) shall consist of suitable container freely suspended from a scale or other suitable load-measuring device and equipped with a suitable discharging Mechanism. The method of control of the loading mechanism shall be such that, as the quantity required in the weighing hopper is approached the material may be added at controllable rate and shut off precisely within the weighing tolerances as specified. The weighing hoppers for cement, mineral admixtures aggregate shall be capable of receiving their rated load, without the weighed material coming into contact with the loading mechanism. Where the rated capacity of a

batching plant, mixing cycle is less than 2.0 m³, additional precautions shall be taken to ensure that the correct number of batches are loaded into the truck mixer. The weighing hoppers shall be constructed so as to discharge efficiently and prevent the buildup of materials. A tare adjustment, up to 10 percent of the nominal capacity of the weigh scale, shall be provided on the weighing mechanism so that the scale can be adjusted to zero at least once each day. Dust seals shall be provided on cement hoppers between the loading mechanism and the weigh hopper, and shall be fitted so as to prevent the emission of cement dust and not affect weighing accuracy. The hopper shall be vented to permit escape of air without emission of cement dust. Before loading concrete materials or mixed concrete into either a stationary mixer or truck mixer any water retained in the mixing drum for washing out purposes shall be completely discharged. The mixing time shall be measured from the time all the materials required for the batch, including water, are in the drum of the mixer. The mixing time shall not be less than that recommended by the manufacturer. Where a continuous mixing plant is used, the complete mixing time shall be sufficient to ensure that the concrete is of the required uniformity.

Concrete shall be handled from the place of mixing to the place of final deposit as quickly as practicable, by method which will prevent the segregation or loss of any of the ingredients. If segregation occurs during transport, the concrete shall be remixed before use. The concrete shall be placed in position and compacted before the initial set of cement has commenced and shall not be subsequently disturbed. Concrete shall not be dropped into position from a height greater than 1.50 metre.

3.8 Slump

If in the opinion of ENGINEER - IN - CHARGE, slump cone tests are required to be performed to establish workability the same shall be carried out at free of cost. Slump tests are however, to serve as guide only.

3.9 Ready Mixed Concrete

The Contractor shall buy the RMC from approved manufacturer only. The Contractor in association with the manufacturer will make a suggested trial mix with correct water cement ratio, slump and workability. The tests results will determine the cement content and water cement ratio that produces the required strength. The design mix as per stipulated strength of concrete mentioned in this technical specification shall be approved by the Consultant or any other designated authority as directed by ENGINEER - IN - CHARGE.

The Contractor should arrange a material hoist to carry the wheelbarrow to the floors under construction for transferring of concrete and a smooth runways is to be provided for their travel to avoid any segregation or concrete mix may be carried by head load for placing of concrete as directed by ENGINEER - IN - CHARGE from the point of transfer of concrete at upper floors. During transferring of concrete to walls or deep beams baffle board, downspout or chute to be used for prevention of segregation. It is essential to closely supervise the discharging of concrete to prevent segregation at all points. The alternative approach can be to pump out the ready mixed concrete to the location. The method of pumping/placing, the W/C ratio and the plasticizer used need to be approved before commencing the operation as defined herein above in this clause.

Regular mandatory tests on the consistency and workability of the concrete after transferring from transit mix trucks at job site shall be done to achieve the specified compressive strength of concrete. The frequency of testing and the acceptability criteria will be according to I.S : 456 and I.S:516. A register of work test of concrete shall be maintained at site by the Contractor. Cube testing register in standard CTE format is to be kept at site. ENGINEER - IN - CHARGE shall decide whether a particular

set of cubes would be tested at site or at a reputed central/state government registered testing house/laboratory. In any case, at least 20% of the testing would be carried out at such laboratories. The Contractor shall undertake the entire cost of transporting of cubes to such testing facilities outside the site and testing charge therein.

In general payment for RMC shall be made on the basis of actual measurement or as per drawing, whichever is less, for different reinforced concrete elements at site. If any deviation from the original drawing is required as per decision of the Controlling Officer, the Contractor shall comply to the same during execution. In such case, the payment will be made based on the actual measurement of different reinforced concrete elements or as per revised drawing issued subsequently whichever is less. No extra payment will be made for wastage during transfer of RMC at site or extra concreting done by the Contractor at his own. The rate includes the cost of materials and labour for carrying of RMC to upper floors, placing, consolidating, finishing, curing & testing etc.

The Contractor shall submit the design mix report and its further corroboration through trial cube tests (both 7 days and 28 days) from a reputed institute for approval by ENGINEER - IN - CHARGE and adoption at site. All related cost would be borne by the Contractor.

No RCC work shall be taken up till such time final test report of trial design mix is not available with ENGINEER - IN - CHARGE.

In case any admixture is used in RMC it shall conform to IS : 9103 latest edition and after obtaining necessary approval from ENGINEER - IN - CHARGE.

For RMC concreting, regular cube tests in the multiple of six (three for 7 days and three for 28 days respectively) are to be carried out as per IS :456 (latest revision) and the works to be carried out as per stipulations laid down in IS codes and clearance by ENGINEER - IN - CHARGE. The decision of ENGINEER - IN – CHARGE shall be deemed as final in this regard.

3.10 Transporting, Placing and Compaction of Concrete

No mixing of concrete shall be started unless the situation where they are to be poured are prepared and kept ready. Concrete shall be poured immediately on preparation. Transporting of concrete shall be done as speedily as possible and also in a manner to prevent segregation of aggregates. No retempered concrete shall be allowed to be used on the works. No concrete shall be allowed to fall through a height more than 1.20 M. where the concrete to be placed from more height it should be done through chute as per specification and relevant IS as directed by ENGINEER - IN - CHARGE.

Before fresh concrete is placed against an already cast and hardened section, such surfaces shall be roughened, swept clean, moistened with water and treated with cement slurry. Fresh concrete shall then be poured as required. Under no circumstances, concrete mixed more than stipulated initial setting time as per IS code shall be used. Dewatering of excavations for concreting where necessary shall be carried out by the Contractor as directed and the rates quoted by the Contractor are deemed to be inclusive of such dewatering. No concreting shall be done in adverse weather condition, except exigencies with proper precautions or prior approval from ENGINEER - IN - CHARGE.

3.10.1 Transportation by Mixer Trucks

These are essentially revolving drums mounted on truck chasis. Truck mixers used in the job shall be labeled permanently to indicate the manufacture specifications for mixing like:

- Capacity of drum.
- Total number of drum revolutions required for complete mixing.

- Mixing speed
- Maximum time limit before completion of discharge and after cement has entered the drum.
- Reduction in time period of discharge.

Due to warm weather or other variables. All above information shall only form guidelines for the manufacture/producer of concrete.

Fulfilment of the stipulated number of revolutions or elapsed time shall not be acceptable criterion. As long as the mixing water limit is not exceeded and the concrete has satisfactory plastic physical properties and is of satisfactory consistency and homogeneity for satisfactory placement and consolidation and is without initial set, the concrete shall be acceptable.

When the concrete is totally mixed in transporting trucks or in case of .shrink-mix concrete, volume of concrete being transported shall not exceed 63% of the rated capacity of the drum. In case concrete is totally mixed in the central batching plant, the transporting truck may be loaded upto 80% of the rated capacity of the drum. In this case the drum shall be rotated at charging speed during loading and reduced to agitating speed after loading is complete.

When transporting concrete by truck mixers, delivery time shall be restricted to 1.50 hours from the time cement has entered the mixer to completion of discharge.

3.10.2 Transportation by Agitating/non-agitating Trucks

Transporting ready mix concrete by this method shall consist of truck chasis mounted with open top bodies. The metal body shall be smooth and streamlined for easy discharge. Discharge may be from the rear when the body is mechanically tilted. Body of the truck shall have a provision of discharge gate. Mechanical vibrators shall be installed at the discharge gate for control of discharge flow.

Agitators, if mounted, also aid in the discharging of concrete from the truck in addition to keeping the concrete alive.

Water shall not be added to concrete in transport in this system.

Bodies of truck shall be provided with protective covers during period of inclement weather.

Delivery period, when adopting this system of transporting, concrete shall be restricted to 30 minutes from the moment all ingredients including cement and water enters in mixer to completion of discharge.

3.10.3 Transportation by Buckets

This method of transportation is very common for transportation of centrally mixed concrete. Buckets of suitable capacities may be fitted with concrete which is totally mixed in central plant and hauled to the job site. Buckets then may be conveyed to the actual point of placement either with the help of crane/ hoist or they may be carted.

As in the case of open truck transportation, water shall not be added to concrete transported in buckets. Concrete shall be protected from inclement weather by necessary covering arrangements. Also, maximum delivery period for this system of transportation from the time cement is introduced into the mixer to completion of discharge shall not exceed 30 minutes.

Before loading concrete in either truck mixer, open bodied trucks or buckets, the containers shall be thoroughly cleaned, washed and dried, so that there is no water or moisture in the container which may effect the designed water content of the concrete.

3.10.4 Transportation by Pumping

Concrete conveyed by pressure through either rigid pipes or flexible hoses and discharged directly into the desired area is termed as pumped concrete. The method of conveying the concrete through pipe lines is dealt with in these specifications.

Method of applying pressure to concrete is by pumps. Pumps to be used shall be either of the two types as mentioned below: -

- a) Piston type pumps
- b) Squeeze pressure type pumps.

Piston pump to be used in the works shall consist of a receiving hopper for mixed concrete, an inlet valve, an outlet valve, and the pump shall be a twin - piston pump. The two pistons shall be so arranged that one piston retracts when the other is moving forward and pushing concrete into the pipe line to maintain a reasonably steady flow of concrete. Single piston pumps shall not be acceptable.

Inlet and outlet valves shall be any one of the following types.-

Rotating plug type Sliding plate type Guided plunger type Swing type Flapper type or any combination of the above.

The pistons shall be mechanically driven using a crank or chain or hydraulically driven using oil or water.

The receiving hopper shall have a minimum capacity of 1.0 cum and the hopper shall be fitted with remixing rotating blades capable of maintaining consistency and uniformity of concrete. The primary power for pumps may be supplied by gasoline, diesel, or electric motors. The primary power unit and the pump unit may be truck, trailer or skid mounted.

Squeeze pressure pumps shall consist of a receiving hopper fitted with re-mixing blades. Re-mixing blades shall be such that these can push the concrete into the flexible hose connected at the bottom of the hopper.

The flexible hose shall pass through a metal drum around the inside periphery of the drum and come out through the top part of the drum.

The drum shall be maintained under a very high degree of a vacuum during operation. The drum shall be so fitted with hydraulically operation metal rollers, which when rotating, create a squeeze pressure on the flexible hose carrying concrete and forces the concrete out into the pipe line.

Effective range of pumps to be used in the work shall be decided by the contractors after studying the site conditions. However, the minimum horizontal range shall not be less than 150 metres and minimum vertical range shall not be less than 50 metres.

Selection of pumps based on discharge capacity shall be decided by the contractors after studying the requirements for the project. Discharge capacity shall be worked out by the contractors and approval obtained from the Engineer. As a guide line figure the contractors may assume a discharge capacity of 15 cubic metre / hour / pump.

3.11 Consolidation and processing of concrete

Concrete for all works shall be compacted by means of suitable vibrating equipment. One or more spare vibrators which are in complete working condition shall always be kept ready at sites to be put into commission in case of failure of the vibrators under use. The vibrators shall be operated by skilled personnel, thoroughly instructed as regards the mode, frequency, duration etc. regarding vibration. Concrete of low volume/ quantum for a particular work may however, be permitted by ENGINEER - IN - CHARGE at their sole discretion to be consolidated by hand only after prior permission.

3.12 Finish to concrete surfaces

Finish to concrete surfaces at various situations shall be as per directions of ENGINEER - IN - CHARGE. Where form finish is specified, the final surface shall be smooth and even and no-undulations, ridges, spots etc. shall be permitted. They shall be laid to pattern as directed. In case surfaces intended and directed for form finish, exhibit any of the defects above mentioned, the surfaces shall be rubbed with carborundum or plastered and finished all as directed at the risk and cost of the Contractor. The decision as to the

acceptability or otherwise of a surface will be notified by ENGINEER - IN – CHARGE and the Contractor will implement the instructions accordingly.

3.13 Cover for reinforcement

Where not specifically indicated in the drawings, concrete cover for reinforcement shall be as per the latest Indian Standards IS 456 - 2000 and as per directions at site from time to time. Proper concrete cover blocks adequately cured to suit various covers as required shall be provided in adequate numbers sufficiently ahead of the work.

3.14 Construction joints

Construction joints in concrete work shall be generally avoided to the maximum extent possible and may only be provided only at predetermined places as per direction and in consultation with ENGINEER - IN - CHARGE. Joints shall be provided as specified in latest Indian Standards or as directed by ENGINEER - IN - CHARGE.

3.15 Curing

It is very important that all cement concrete work shall be cured properly. All concrete work shall be kept continuously in a damp or wet condition by pouring or by covering with a layer of moist sack , canvas, hessian or similar material for a period as stipulated in the relevant IS codes and specifications from the date of concreting. Water used for curing shall also be free from any deleterious substances and shall generally be fit for drinking. The work shall be adequately protected from drying, winds and direct sun rays. The Contractor should arrange at his own cost a temporary water supply line with provision of centrifugal pump, valves etc. for curing and constructional purpose at higher level. A sample sketch is enclosed for the reference purpose.

3.16 Damp Proof Course

The damp proof course shall consist of a layer of 40mm thick PCC (1:2:4) type B0 and shall be mixed with water proofing compound conforming to IS: 2645 liquid grade as per manufacturer specification and laid as specified in para 5.42 on page 101 of MES Schedule (Part I). Water proofing compound shall conform to IS2645. It shall be mixed with concrete in the proportion and in the manner as given in manufacturers instructions. Deviations if any shall be priced on the basis of water proofing compound actually incorporated in the work.

Damp proof course shall be provided on all brick walls, PCC walls and brick pillars for their full length and width at the ground floor. Damp proof course shall also be provided under openings/door opening at depressed level including vertical faces of depressed level and including vertical faces of depressed portion of opening as per requirement of clause 5.8.1.3 of IS - 2212. However, damp proof course shall not be provided over dwarf walls/RCC columns.

4 Formwork

4.1 Materials and Design

The method and design of form work to be adopted by the Contractors is to be produced for approval of the same by ENGINEER - IN – CHARGE before any form work is taken up.

The form work shall be of approved 12 mm. thick water proof ply surface to be in contact with concrete, to be planed smooth. In every case joints of the shuttering are to be such as to prevent the loss of liquid / water from concrete. In ply shuttering the joints shall be perfectly close and lined.

Steel shuttering using hydraulic jacks shall preferably be used in all possible cases and as directed by ENGINEER - IN - CHARGE.

If any particular materials, or materials be specified in the schedule of quantities for form work such particularly specified material or materials shall be used in work. The form work shall be so constructed as to remain sufficiently rigid during placing of the concrete. All shuttering and forming must be adequately stayed and braced to the

satisfaction of ENGINEER - IN – CHARGE for properly supporting the concrete during the period of hardening. The forms shall have sufficient strength and rigidity to hold concrete and withstand the pressure of remaining and vibration without excessive deflection from the prescribed lines and more so when the concrete is vibrated. The surface of all forms in contact with concrete shall be clean, rigid, watertight and smooth. Suitable devices shall be used to hold corners, adjacent ends and edges of panels of other forms together in accurate alignment.

The form work shall conform to the shape, lines and dimensions to suit the R.C.C. members as shown on drawings and be so constructed. Form work shall be adequately designed to support the full weight of workers, fresh placed concrete without yielding settlement or deflection, and to ensure good and truly aligned concrete finished in accordance with the construction drawings. A camber in all directions of 6mm for every 5 M span in all slab and beam centering shall be given to allow for unavoidable sagging due to compression or other causes , unless otherwise specifically instructed in writing by ENGINEER - IN - CHARGE.

The form work shall be as designed that the sides of the beams retain its position and does not get bulged these however should be so designed that the sides of the beams can be first struck leaving the soffit of beams and the supporting props in position. Props shall be designed to allow accurate adjustment and to permit of their being struck without jarring the concrete. No bamboo propping shall be used . Bulged section shall not be accepted and need to be rectified or rebuilt as per instruction of ENGINEER - IN - CHARGE. No extra claim , in any case shall be entertained by ENGINEER - IN - CHARGE.

Temporary openings shall be provided at the base of columns forms and at other points where necessary to facilitate cleaning and observation immediately before concrete is deposited.

4.1.1 Vertical Shuttering

The vertical shuttering shall be carried down to such solid surface and is sufficiently strong to afford adequate support and shall remain in position until the newly constructed work is able to support itself. Props shall be securely braced against lateral deflection. Where timber props are used like bullies, they shall be a minimum diameter of 10cm. and shall be straight and adequately strong. The spacing of such struts shall be designed to carry to carry loads imposed on it without undue deflection of the members supported by the props. The spacing of props shall be approved by ENGINEER - IN - CHARGE and any alterations suggested by him shall be carried out at Contractor's expense. Bracing shall be provided as directed without extra cost. Contractor shall allow in his rates for providing props and struts for any height shown in the working drawings issued to Contractor from time to time

4.1.2 Curve & Circular shuttering

Unused and new waterproof ply of 6 mm thick supported by good quality wooden batten shall be used. Repetition of the material will be same as stated above for the other shuttering.

4.2 Water Tightness

It is the Contractor's responsibility to ensure that the forms are checked for water tightness just before concreting operation starts and to make good any deficiencies.

4.3 Cleaning and Treatment of Forms

All rubbish, particularly chippings, shavings and saw dust, shall be removed from the interior of the forms before the concrete is placed and the form work in contact with the concrete shall be cleaned and thoroughly wetted or treated with an approved composition. Care shall be taken that such approval composition is kept out of contact with the reinforcements. Interior of all moulds and boxes must be thoroughly washed out with a hose pipe or

otherwise so as to be perfectly clean and free from all extraneous matter previous to the deposition of concrete.

Prior approval of the form work should be taken from ENGINEER - IN – CHARGE before placing reinforcements on form work. No concrete shall be commenced until ENGINEER - IN – CHARGE has inspected the form work and until his approval is obtained. A notice of at least 24 hours shall be given to the opinion of ENGINEER - IN – CHARGE any materials is not accordance with the specification or the form work, is wrongly done or otherwise defective the Contractor shall immediately remove such materials from site and replace the same and rectify any other defects in accordance with the instruction of ENGINEER - IN – CHARGE and to his entire satisfaction.

The lines , levels, form work, reinforcement etc shall be checked by the Contractor with subsequent approval / checking by ENGINEER - IN – CHARGE prior to allowing of concreting , by ENGINEER - IN - CHARGE. However, the cost, labour etc for such checking shall be borne by the Contractor and this will not relieve any of the obligations under this contract.

4.4 Stripping

Forms shall be left in place and removal shall be done as per norms laid down in IS codes and is authorized by ENGINEER - IN – CHARGE and shall then be removed with care so as to avoid injury to concrete. In no circumstances shall forms be struck until the concrete reaches a strength of at least twice the strength as to which the concrete may be subjected at the time of striking. The strength referred to shall be that of concrete using the same cement and aggregates, with the same proportions, and cured under conditions of temperature and moisture similar to these existing on the work. Where possible, the form work should be left longer as it would assist the curing. Exposed surfaces of concrete which are indicated/ required to be plastered shall be roughened with wire brushes and hacked out closely immediately after removal of formwork by free of cost.

Any honeycomb , appeared after removal of form work shall be mended as per procedures laid down in IS codes including pressure grouting required , if any, as instructed by ENGINEER - IN - CHARGE.

4.4.1 Stripping Time

In normal circumstances (generally where temperature are above 20oC) and where ordinary cement is used, forms shall be struck after expiry of the following periods and as per relevant IS code unless otherwise directed at site by ENGINEER - IN - CHARGE.

4.5 Form Work in Lift for Continuous Surfaces

Where forms for continuous surface are placed in successive units, (as for example in columns or walls) the forms shall fit tightly over the completed surface so as to prevent leakage of slurry from the concrete and to maintain accurate alignment of the surface.

4.6 Procedure While Removing the Form Work

All form work shall be removed without such shock or vibration as would damage the reinforced concrete. Before the soffit and strata are removed the concrete surface shall be exposed where necessary in order to ascertain that the concrete has sufficiently hardened. Proper precautions shall be taken to allow for the decrease in the rate of hardening that occur with all cements in the cold-weather.

4.7 Tolerances

The following shall be the maximum permissible tolerance :-

- a) On general setting out dimensions upto 4 M. in length a tolerance upto 3mm will be allowed.
- b) On lengths of more than 4 M. tolerance of not more than 5mm will be allowed.
- c) On the cross sectional dimensions of columns, beams, slabs, faces, chajjas, mullions, grills, fins, louvers, and such other members tolerance more than 2mm will not be allowed.
- d) The top surface of concrete floor slab will be within plus/minus 3mm of the level and line shown on the drawings.

- e) Columns and walls and other vertical members shall not be more than 3mm out of plumb in their storey height and not more than 6 mm out of plumb in their full height.
- f) If work is not carried out within the tolerance set out above (a) to (d) the cost of all rectification measures of dismantling and reconstructing as decided by ENGINEER - IN - CHARGE shall be borne by the Contractor. In case of work dismantled, the same shall not be measured and no payment even for cement and reinforcement shall be allowed .

4.8 Openings and inserts

All openings and inserts which are designated in due time or as required for services, will be exactly provided by the Contractor. The Contractor should also fix the anchors or such items which may be supplied by the Proprietor in exact position and in perfect lines and levels. Inserts apply to such items as timber, dowels, bolts, loop, brackets, suspension irons, hooks, screws, plates, pipe of various types and diameter etc. etc. Openings in concrete or masonry must be provided in exact location to correct shape, size and depth or slightly bigger, if directed so, as shown in drawings or as instructed. It must be clearly understood that the provisions of inserts and openings as contemplated in this contract are to be carried out with "utmost precision" and any deviation of the same from that as shown in drawing or instructed, have to be rectified by the Contractor at his own cost and responsibility. The Contractor should make provision of openings to deep beams and their members at bottom or at lower level as necessary for cleaning purpose prior to concreting.

5 Reinforcement

High strength deformed steel bars produced by Thermo Mechanical Treatment process (TMT steel bars of grade Fe 500) shall be used for reinforcement work unless otherwise mentioned.

This shall conform to the standard and quality in accordance with IS:1786 (Latest edition) and other relevant IS Codes. Bending and cutting of reinforcing steel bars shall conform to IS: 2502. Lapping of bars where necessary shall be done as per IS specifications.

5.1 Storage

The reinforcement shall not be kept in direct contact with the ground but stack on top of an arrangement of timber sleepers or the like. Reinforcement shall be coated with cement wash before stacking to prevent scale and rust. Fabricated reinforcement shall be carefully stored to prevent damage, distortion corrosion and deterioration.

5.2 Quality

All steel shall be of Grade I quality unless specifically permitted by the Engineer. Re-rolled material is generally not permitted. However, only approved / authorized re-rolling manufacturer can be allowed to supply only at the discretion of Engineer. With each lot, contractor shall submit the manufacturer's test certificate for steel. Random tests on steel supplied by Contractor may be performed by owner as per relevant Indian Standards. All cost incidental to such tests shall be at "Contractor's Expense". Steel not conforming to specification shall be rejected.

All reinforcement shall be clean, free from grease, oil, paint, dirt, loose mill scale, loose rust, dust, bituminous material or any other substances that will destroy or reduce the bond. All bars shall be thoroughly cleaned before being fabricated. Pitted and defective bars shall not be used. All bars shall be rigidly held in position before concreting. No welding of rods to obtain continuity shall be allowed unless approved by the Engineer. If welding is approved, the work shall be carried out as per IS-2751 and according to best modern practices and as directed by the Engineer. In all cases of important connections, strength of bars welded Special precautions, as specified by the Engineer shall be taken in the welding of cold worked reinforcing bars and bars other than mild steel.

5.3 Laps

Laps and splices for reinforcement shall be as shown on the drawings. Splices in adjacent bars shall be staggered and the locations of all splices, except those specified on the drawings, shall be approved by the Engineer. The bars shall not be lapped unless the length required exceeds the maximum available lengths of bars at site.

5.4 Bending

All bars shall be accurately bent according to the sizes and shapes shown on the approved detailed working drawings / bar bending schedules. They shall be bent gradually by machine or other approved means. Reinforcing bars shall not be straightened and rebend in a manner that will injure the material, crack or split. Bar of over 25 mm in diameter shall be bent cold, except bar specifically approved by the Engineer. Bars, which depend for their strength on cold working, shall not be bent hot. Bars bent hot shall not be heated beyond red colour (not exceeding 645°C) and after bending shall be allowed to cool slowly without quenching. Straightening and rebending be such as shall not in the opinion of Engineer injure the material_ No reinforcement shall be bent when in position in the work without approval, whether or not it is partially, embedded in hardened concrete. Bars having kinks or bends other than those required by design shall not be used.

5.5 Fixing

Reinforcement shall be accurately fixed by any approved means and maintained in the correct position shown in the drawings by the use of blocks, spacers and chairs as per I.S. 2502 to prevent displacement during placing and compaction of concrete. Bars intended to be in contact at crossing point shall be securely bound together at all such points with 16 gauge annealed soft iron wire. The vertical distances required between successive layers of bars in beams or similar members shall be maintained by the provision of mild steel spacer bars at such intervals that main bars do not perceptibly sag between adjacent spacer bars.

5.6 Inspection

Erected and secured reinforcement shall be inspected and approved by Engineer prior to placement of concrete.

5.7 Sampling & Testing

Sampling & testing for following physical test of steel shall be carried out as per relevant IS Codes.

- 1) Tensile strength / Proof Stress.
- 2) Nominal Mass
- 3) Bend / Rebend Test
- 4) Elongation Test

The frequency of testing shall be as per relevant code or as directed by Engineer depending on the source of materials, previous test results etc.